SENSIVITY TESTS OF SOME RADIO RECEIVERS FROM 1 Mc/s TO 20 Mc/s

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ABSTRACT. Sensitivity tests were made for five different radio receivers (Philips 313 H, Philips 595 HN, Philips 335 HN, G.E. 6 U 5 and H.M.V. 17 Q 7) from about 1 to 20 Mc/s. The Philips 595 HN showed the highest sensitivity and the H.M.V. 17 Q 7 the poorest over the range of frequencies tested. The two old receivers (Philips 313 H and G.E. 6 U 5) showed insensitive points, one at 7 Mc/s and the other at 4 Mc/s.

Sensitivity tests were made for five different radio receivers over a range of frequencies from about 1 to 20 Mc/s. The receivers under test were :—(1) Philips 313 H, (2) Philips 595 HN, (3) Philips 335 HN, (4) G.E. 6 U5 and (5) H.M.V. 17 Q 7. Each of the receivers examined was of the superheterodyne A.C./D.C. Type.

DEFINITION OF SENSITIVITY

The sensitivity of a receiver is that characteristic which determines the minimum R.F. input signal voltage capable of giving a desired value of audio output. Thus the R.F. input voltage in millivolts or microvolts required to give an audio output of 50 milliwatts to the loudspeaker, when the receiver is connected to a standard dummy antenna, measures the sensitivity required, the output being measured across a non-reactive resistance equal to the impedance of the voice coil.

METHOD OF MEASUREMENT

From a standard signal generator a definite frequency was generated at which the receiver under test was expected to operate. The carrier was then modulated by the 400 cycles modulation of the signal generator. The radio receiver was tuned to this frequency. The volume-control setting was kept at the maximum position and the tone-control setting at the minimum position. By means of Weston's analyser the voltage across the output terminals was measured. By adjusting the attenuator of the signal generator the output voltage level of the carrier was varied until the voltage indicated by the output analyser indicated a voltage that corresponded to 50 milliwatts output.

If R be the value of a non-reactive resistance equal to the impedance of the voice coil and V the required voltage corresponding to 50 milliwatts output across the resistance R,

Then $$\frac{V^2}{R} = .05 \text{ watts} \quad \text{or} \quad V = \sqrt{R \times .05} \text{ volts.} \quad \ldots \quad (1)$$

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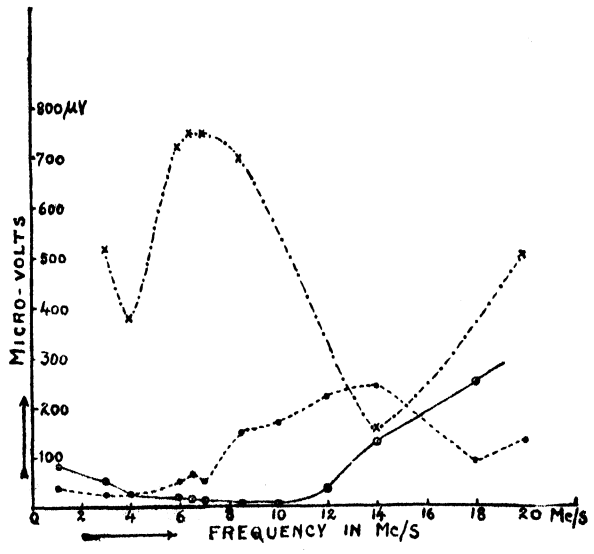
The impedance of the voice coil of the loudspeaker for each receiver was measured in the usual way and the voltage V was then found by calculation according to (1). The input voltage (in μV) into the receiver could then be adjusted to give the requisite output voltage across R. Actually, however, the voltage across the voice coil was made to have the requisite value by adjusting the attenuator in the signal generator. This procedure gave substantially the same result.

SENSITIVITY MEASUREMENTS

In Table I are given all the measured values of sensitivity for the radio receivers over a range of frequencies from about 1 Mc/s to 20 Mc/s. The sensitivity curves for the three comparatively new receivers (Philips 595 HN., Philips 335 HN. and H.M.V. 17 Q 7) are shown in Fig. 1. The curves for the two old receivers (Philips 313 H and G.E. 6 U 5) are shows in Fig. 2. The two old receivers showed insensitive points, one at 7 Mc/s and the other at 4 Mc/s.



—⊙—⊙—⊙— Philips 595 HN.
—•—•—•— ,, 335 HN.
—×—×—×— H.M.V. 17 Q 7.

FIG. 1

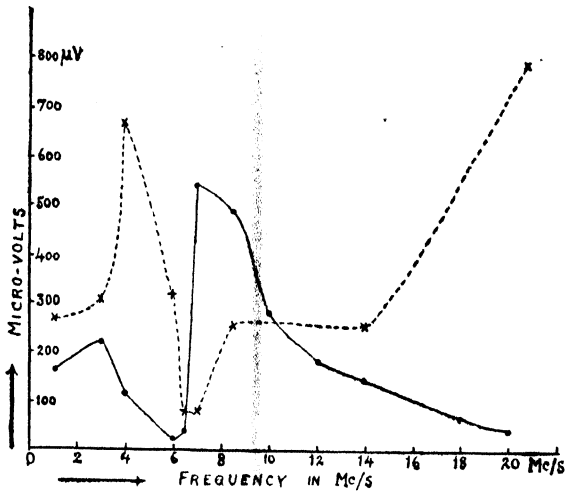


FIG 2

TABLE I

Freq. Mc/s	Sensitivity in μV				
	P 313 H.	P. 595 HN.	P. 335 HN.	G.E. 6 U 5	H.M.V. 17 Q 7
1.1	165	86	40	270	—
3.0	220	56	25	310	520
4.0	115	23.6	26	670	380
6.0	26	22	51	320	720
6.5	42	14.0	65	80	750
7.0	545	13.5	50	80	750
8.5	490	8.5	150	260	700
10.0	285	6.0	170	—	—
12.0	185	38	220	—	—
14.0	150	128	240	255	160
18.0	70	250	90	—	—
20.0	50	—	130	820	500

2—1625P—5

GENERAL CONCLUSIONS

I. *Philips 313 H.*—The maximum sensitivity was observed at 6 Mc/s, the value being 26 μV. There was a point of very low sensitivity at 7 Mc/s, the value being as high as 545 μV from 7 to 20 Mc/s, the sensitivity was found to increase steadily.

II. *Philips 325 HN.*—The maximum sensitivity was observed at 10 Mc/s, the value being 6 μV. There was a very gradual increase in sensitivity from 1 Mc/s to 10 Mc/s after which the sensitivity decreased steadily.

III. *Philips 335 HN.*—The maximum sensitivity was observed at 3 Mc/s, the value being 25 μV. The sensitivity was found to decrease steadily up to 14 Mc/s where the minimum sensitivity observed was 240 μV.

IV. *G.E. 6 U 5.*—The maximum sensitivity was observed at 7 Mc/s, the value being 80 μV. The sensitivity showed an abrupt fall at 4 Mc/s, its value being as high as 670 μV. From 7 Mc/s the sensitivity was found to decrease steadily.

V. *H.M.V. 17 Q 7.*—The sensitivity was found to be small at about 6.5 Mc/s, the value being as high as 750 μV. From 6.5 Mc/s the sensitivity increased till a maximum value of 150 μV was attained at 14 Mc/s, beyond which the sensitivity decreased.

The maximum sensitivity values of the five receiving sets under test are given in Table II.

TABLE II

Name of Receiver	Max. sensitivity in μV	Years in use
Philips 313 H.	26 μV at 6 Mc/s	6
Philips 595 HN.	6 ,, at 10 Mc/s	2
Philips 335 HN.	25 ,, at 3 Mc/s	½
G.E. 6 U 3	80 ,, at 7 Mc/s	7
H.M.V. 17 Q 7	160 ,, at 14 Mc/s	1

The comparison shows that the Philips 595 HN. receiver has the highest sensitivity over a range of frequencies from 1 to 20 Mc/s (15 metres to 300 metres). Over the same range the H.M.V. 17 Q 7 showed the poorest sensitivity. The receivers under test were not, however, brand-new Some of them were six or seven years old. The years, the different receivers are known to be in use, are also noted in Table II.

ACKNOWLEDGEMENT

In conclusion we place on record our sincere thanks to the owners of the receiving sets for their kind loan which made these measurements possible.

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